DOE/EA-1415

ENVIRONMENTAL ASSESSMENT
PROPOSED CONVEYANCE
OF THE
AMERICAN MUSEUM OF SCIENCE AND ENERGY
AND ASSOCIATED PROPERTY,
PARCEL G, AND PARCEL 279.01

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U.S. Department of Energy
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ABBREVIATIONS AND ACRONYMS

AMSE	American Museum of Science and Energy
AURP	Association of University Research Parks
BJC	Bechtel Jacobs Company LLC
BMP	best management practice
CAA	Clean Air Act of 1970
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
CROET	Community Reuse Organization of East Tennessee
dBA	A-weighted decibels
DOE	U.S. Department of Energy
EA	environmental assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
FIR	Federal Industry and Research
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act of 1981
FRP	Facilities Revitalization Project
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
GSA	General Services Administration
IVSTP	Innovation Valley Science and Technology Park
LESA	Land Evaluation and Site Assessment
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NRCE	National Register Criteria for Evaluation
NRHP	National Register of Historic Places
OMB	Office of Management and Budget
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Office
ORR	Oak Ridge Reservation
PAH	polycyclic aromatic hydrocarbon
PILT	payment-in-lieu-of-tax
PSD	prevention of significant deterioration
RI/FS	remedial investigation/feasibility study
ROI	region of influence
ROW	right-of-way
SNS	Spallation Neutron Source
SR	state route
SVOC	semivolatile organic compound
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TN-SHPO	Tennessee State Historic Preservation Officer

TRU	transuranic
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
VOC	volatile organic compound
Y-12	Y-12 National Security Complex

1. INTRODUCTION

1.1 PURPOSE AND NEED FOR U.S. DEPARTMENT OF ENERGY ACTION

The proposed action evaluated in this environmental assessment (EA) is the U.S. Department of Energy (DOE) conveyance of the American Museum of Science and Energy (AMSE) and associated property, Parcel G, and Parcel 279.01. The purpose of the proposed DOE action is to provide for the long-term financial stability of the AMSE to preserve the museum as an asset to the city of Oak Ridge and the surrounding region. The proposed conveyance is also intended to help offset the long-term cost of operating the museum. The purpose of the proposed action is also to convey excess (i.e., property not needed to fulfill DOE current or foreseeable future missions) DOE-Oak Ridge Office (ORO) real property (i.e., buildings and land) for economic development to help offset potential economic losses resulting from DOE downsizing, facility closeouts, and work force restructuring.

The need for DOE action arose from the elimination on October 1, 2000, of approximately $1.2 million in federal funds that, in the past, have been available to operate the museum. Funding alternatives must be pursued that are consistent with both DOE's intentions and the economic development priorities of the region. DOE also recognizes that transferring excess land and facilities for local economic development purposes can benefit the federal government by reducing or eliminating DOE's landlord costs.

1.2 BACKGROUND

From 1949 until October 2000, DOE and its predecessors have provided funding and oversight of the museum's management. The Administration's fiscal year (FY) 1998 budget initiated a phasing out, over a 2-year period, of federal direct funding for AMSE's operation through the Oak Ridge Landlord account. The decision to eliminate AMSE's federal funding stemmed from concerns raised by the Office of Management and Budget (OMB) about whether the operation of a museum is an appropriate mission for DOE. Federal funds to AMSE in FY 2000 totaled $1.2 million, down from $1.5 million in FY 1998.

Dr. James Decker, Acting Director of the Office of Science, testified on March 1, 2000, before the House Subcommittee on Energy and Environment that "alternative funding mechanisms are being developed" to cover the continued operating costs of the museum. Dr. Decker's testimony referred to DOE's requirement that Oak Ridge National Laboratory's (ORNL's) new contractor, UT-Battelle, provide, by October 31, 2000, a plan for AMSE's financial stability. In October 2000, UT-Battelle submitted a report to DOE entitled "A Plan for the Museum's Long-term Financial Stability" (UT-Battelle 2000). DOE used the report to help develop the proposed action being evaluated, and it provided much of the information contained in this EA.

AMSE, formerly the American Museum of Atomic Energy, opened in March 1949. During its first 29 years, the museum's exhibits emphasized atomic energy. The energy theme was broadened in 1978, when the museum was renamed with its present title to reflect more clearly the mission of the newly created DOE. Working with a number of operating contractors, DOE-ORO has provided oversight of the museum's contracts and management policies. In October 1998, DOE transferred management responsibility for the museum, including supervision of AMSE's operating contractor, to UT-Battelle. DOE has retained oversight of AMSE's personnel and operating policies. In FY 2001, UT-Battelle provided approximately $1.2 million from their overhead account to operate AMSE. Since then, about $1.5 million in funding has been shared among DOE's three major contractors [UT-Battelle, BWXT Y-12 National Security Complex (Y-12), and the Bechtel Jacobs Company LLC (BJC)]. The AMSE currently generates roughly

$350,000 in annual revenues based on admissions, memberships, rental, and retail sales. Grants and exhibit sponsorships generate additional revenue (Stow 2006).

The AMSE and associated property, Parcel G, and Parcel 279.01 are all located within the city limits of Oak Ridge (Fig. 1.1). The AMSE property (Parcel 482) is located between South Tulane Avenue and Badger Avenue on 15.43 acres. The associated property (Parcel 483) is located adjacent to the AMSE on 1.79 acres between South Illinois Avenue and Tulane Place. Parcel G contains about 20.0 acres and is located southeast of the intersection of Bethel Valley and Scarboro roads. A portion of Parcel G is within the area of the Oak Ridge Institute for Science and Education (ORISE) Scarboro Operations Site. Parcel 279.01 is a small piece of undeveloped property (0.662 acre) located on the corner of Laboratory Road and Administration Road.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

This EA presents information on the potential impacts associated with the proposed conveyance. DOE has prepared this EA to assess the potential consequences of its activities on the human environment in accordance with the Council on Environmental Quality (CEQ) regulations [40 *Code of Federal Regulations* (*CFR*) Parts 1500–1508][1] implementing National Environmental Policy Act of 1969 (NEPA) and DOE NEPA Implementing Procedures (10 *CFR* 1021). If the impacts associated with the proposed action are not identified as significant as a result of this EA, DOE shall issue a Finding of No Significant Impact (FONSI) and will proceed with the action. If impacts are identified as potentially significant, an Environmental Impact Statement (EIS) will be prepared.

This EA (1) describes the existing environment for each parcel relevant to potential impacts of the proposed action and alternatives; (2) analyzes potential environmental impacts, including those from development of a range of uses; (3) identifies and characterizes cumulative impacts that could result from the proposed action in relation to other ongoing or proposed activities within the surrounding area; and (4) provides DOE with environmental information for use in prescribing restrictions to protect, preserve, and enhance the human environment and natural ecosystems.

Certain aspects of the proposed action have a greater potential for creating adverse environmental impacts than others. For this reason, CEQ regulations (40 *CFR* 1502.1 and 1502.2) recommend a "sliding-scale" approach so that those actions with greater potential effect can be discussed in greater detail in NEPA documents than those that have little potential for impact.

Implementation of the proposed action also requires compliance with Sect. 120 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Section 120(h) requires the identification of uncontaminated property transferred by federal agencies. This identification is based on an investigation of the property to determine the presence or likely presence of a release or threatened release of any hazardous substance or any petroleum product or its derivatives on the property.

DOE prepared CERCLA Sect. 120(h) reports (DOE 2002a and 2002b) to satisfy this requirement. The reports document the review of the properties and pertinent records to identify any areas where hazardous substances or petroleum products were known to have been released or disposed of. Based on its investigation and the information set forth in the documents, DOE has identified the AMSE, Parcel G,

[1] *Code of Federal Regulations.*

and Parcel 279.01 as "uncontaminated property" in accordance with CERCLA Sect. 120(h)(4)(A). The results of the investigation were provided to the U.S. Environmental Protection Agency (EPA), Tennessee Department of Environment and Conservation (TDEC), and city of Oak Ridge officials. The state of Tennessee and EPA concurred with DOE's determination. Copies of the correspondence from these agencies are included in Appendix A.

2. DESCRIPTION OF ALTERNATIVES

2.1 PROPOSED ACTION

DOE proposes to convey the AMSE and associated property, Parcel G, and Parcel 279.01 to the American Museum of Science and Energy Foundation, city of Oak Ridge, or other managing entity. The managing entity would oversee the operation of the AMSE and would develop Parcel G, Parcel 279.01, and the property associated with the AMSE for a variety of uses. Upon completion of the conveyance, the managing entity would also take a leadership role in a development campaign designed to establish an endowment for the museum.

After having established the $10 to $15 million endowment, the AMSE would be able to fund its $1.8 million annual budget without the need for further allowable cost revenues from DOE contractors. This funding would come from increased AMSE revenues, AMSE endowment revenues, grants, and other private and corporate gifts (AMSEF 2006).

The process for transferring real property at defense nuclear facilities for economic development is described in a DOE-issued interim final rule, "Transfer of Real Property at Defense Nuclear Facilities for Economic Development" (10 *CFR* Part 770). The rule became effective on February 29, 2000 (65 *Federal Register* 10685). The *Federal Register* notice of the rule is provided in Appendix B. The AMSE facility and property are proposed for conveyance because federal funding for the museum's operation has been eliminated due to OMB concerns (see Sect. 1.2). Parcel G and Parcel 279.01 are being conveyed because DOE has determined that they are excess.

Because specific uses of Parcel G, Parcel 279.01, and the property associated with the AMSE would not be known prior to the conveyance, DOE has developed reasonably foreseeable scenarios and uses to bound the impacts analysis. Scenarios identify potential tenants, utilities and infrastructure, areas to be excluded from development, and a range of emissions, effluents, and wastes that could result from commercial and industrial activities. Parcel G may be developed for small-scale offices, light industrial use, or retail businesses. Because of the small size of Parcel 279.01 (0.662 acres), it could be suitable for a small office or retail business. The open property located in front of the AMSE, along South Illinois Avenue, may be suitable for retail businesses or offices.

2.2 NO ACTION ALTERNATIVE

The no action alternative provides an environmental baseline with which impacts of the proposed action and alternatives can be compared. The no action alternative must be considered even if DOE is under a court order or legislative command to act. See 10 *CFR* 1021.321(c).

Under the no action alternative, UT-Battelle, BWXT Y-12, and BJC would continue to fund the operation of the museum. It is anticipated that these contractors would not be able to continue this type of funding on a long-term basis, and, at some time in the future, the museum could be forced to close or limit hours of operation because of the lack of continued funding. Parcel G and Parcel 279.01 would remain DOE property. However, because these two parcels have been determined by DOE to be excess, at some time in the future DOE could choose to dispose of them through the appropriate regulatory processes.

2.3 ALTERNATIVES DISMISSED FROM CONSIDERATION

2.3.1 Conveyance to the GSA

If at sometime in the future AMSE was determined to be excess property, DOE could report the museum along with Parcel G and Parcel 279.01 to the General Services Administration (GSA) for disposition as an alternative to the proposed action. The requirements of the Federal Property and Administrative Services Act of 1949 and the Federal Property Management Regulations (41 *CFR* Parts 101-47 and 109) govern this process. The GSA screens other federal agencies to determine their interest in the property. If no federal agencies indicate any interest, the property is declared surplus to the Federal Government and made available to the non-federal public sector. If no public entities express interest, the property can be sold to the private sector. Because GSA takes on much of the responsibility with these types of conveyances, DOE has less control over the ultimate use of the property.

Because the AMSE is considered to be such a valuable asset to the city of Oak Ridge and the surrounding region, and because AMSE's future is a fundamental component of the city's desire to expand tourism and protect the community's historical legacy, this alternative was dismissed from detailed consideration.

3. AFFECTED ENVIRONMENT

3.1 LAND AND FACILITY USE

The AMSE is located on 15.43 acres of government-owned land (Fig. 3.1) and has operated in its present facility since 1975. The museum occupies a 53,000 ft^2, two-story building that includes 8 exhibit halls, 2 lecture/demonstration rooms, a 300-seat auditorium, a classroom laboratory, a large lobby with recessed display areas, a retail gift shop, and offices. An adjacent building leased by the city houses the Oak Ridge Convention and Visitors Bureau. A storage trailer and warehouse located behind the main facility provide an additional 2300 ft^2. The property also includes a picnic area; a parking area to accommodate 272 automobiles, 12 buses, or 12 cars with trailers; and 4 parking spaces for the handicapped. A large, 1.79-acre open area (Parcel 483) is located between Tulane Place and South Illinois Avenue, and a smaller, open area is located behind the museum. Adjacent land use to AMSE is predominantly commercial, and the city's municipal complex is located adjacent to the rear of the museum property. The portion of the property located between Tulane Place and South Illinois Avenue is currently zoned by the city of Oak Ridge as RG-1 (Residential, Open Space, and Reserved Districts). The main portion of the property is zoned as O-2 (Office Districts).

Parcel G contains about 20.0 acres and is located southeast of the intersection of Bethel Valley and Scarboro roads (Fig. 3.2). A portion of Parcel G is within the area of the ORISE Scarboro Operations Site (formerly the South Campus Facility). The Scarboro Operations Site supported research on the biological effects of radionuclides on animals. The portion of Parcel G that is within the boundary of the Scarboro Operations Site was an area where only unexposed animals were housed or grazed. In addition to pasture, the area contained various barns and a three-tiered swine waste treatment pond system. Hay is periodically cut off of the remaining pasture area. A small area in the eastern portion of the property is currently wooded. Scarboro Creek and an associated drainage also cross the site. A narrow riparian zone and some wetlands also occur along the creek. Nearby land uses include the Y-12 Complex buffer area, Bethel Valley Industrial Park, Commerce Park, and the University of Tennessee Forestry Station and Arboretum. Parcel G is currently zoned by the city of Oak Ridge as FIR (Federal Industry and Research).

Parcel 279.01 is a small piece of undeveloped property (0.662 acre) located on the corner of Laboratory Road and Administration Road (Fig. 3.3). This parcel is open with mowed lawn and a few scattered trees. Adjacent land use includes a soccer field and an office supply business. A vacant parcel and the Laboratory Road entrance to the Roane State Community College, Oak Ridge Branch, are located directly across from Parcel 279.01. The current city of Oak Ridge zoning for Parcel 279.01 is O-2 (Office Districts).

3.2 AIR QUALITY

The state of Tennessee has adopted the National Ambient Air Quality Standards (NAAQS) set by EPA for six principal pollutants considered harmful to public health and the environment. These pollutants include particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter, sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Based on the ambient (outdoor) levels of the criteria pollutants, EPA evaluates individual Air Quality Control Regions to establish whether or not they meet NAAQS. Areas that meet NAAQS are classified as attainment areas; areas that exceed NAAQS for a particular pollutant(s) are classified as non-attainment areas for the pollutant(s).

Air quality surrounding the Oak Ridge area is relatively good. However, Anderson County has been designated as a non-attainment area for the 8-hr ground level O_3 standard, as part of the larger Knoxville non-attainment area. Also, Anderson County and a portion of Roane County have been designated as non-attainment for the new, stricter federal fine particulate matter ($PM_{2.5}$) air quality standard. For all other criteria pollutants for which EPA has made attainment designations, existing air quality in the greater Knoxville and Oak Ridge areas is in attainment with NAAQS.

Oak Ridge is located in a Class II prevention-of-significant-deterioration (PSD) area. One set of allowable increments exists for Class II PSD areas, and more stringent increments apply to Class I PSD areas, which include national parks that exceed 6000 acres and some other national parks, monuments, wilderness areas, and other areas specified in 40 *CFR* 51.166. The nearest such area is the Great Smoky Mountains National Park, located about 35 miles southeast of Oak Ridge. PSD standards exist for SO_2, NO_2, and PM-10.

3.3 GEOLOGY AND SOILS

3.3.1 Site Geology

Oak Ridge lies within the Valley and Ridge Physiographic Province of the Southern Appalachian Mountains. The Valley and Ridge Province in Tennessee consists of Cambrian- to Ordovician-age sedimentary rocks that occur as northeast-southwest-trending thrust sheets formed during the Late Paleozoic Appalachian mountain-building episode. These thrust sheets have brought older rocks overlying younger rocks at the base of each thrust sheet. Because the internal layers of each thrust sheet are similar to those on either side, the rock outcrop sequence for each sheet is similar. This has produced similar topography on each sheet. Ultimately, this has created the pattern of parallel valleys and ridges characteristic of the region. Erosion-resistant sandstones, siltstones, dolomites, and cherty formation help form the higher ridges while less-resistant limestones and shales underlie the valleys. Karst processes that form sinkholes and cavern systems have created extensive underground drainage networks in the more soluble carbonate-rich rocks.

The typical sequence of rocks outcropping in the Valley and Ridge Province include, from older to younger, Cambrian-age Rome Formation shales, siltstones, and sandstones, Cambrian-age Conasauga limestones and shales, Cambrian-Ordovician-age Knox Group cherty dolomites and limestones, Ordovician-age Chickamauga Group limestones and shales, and much less extensive outcrops of Silurian- through Mississippian-age rocks.

There are no detailed geologic investigations of the AMSE site. Regional geologic maps indicate that the undivided members of the Chickamauga Group underlie the AMSE (Hatcher et al. 1992). This unit consists mostly of the Chickamauga Limestone with minor components of siltstones and shales.

There are no detailed geologic investigations of the Parcel 279.01 site. Regional geologic maps indicate that the undivided members of the Chickamauga Group underlie Parcel 279.01 (Hatcher et al. 1992). This unit consists mostly of the Chickamauga Limestone with minor components of siltstones and shales.

The 1700-ft-thick Chickamauga Group underlies Parcel G (DOE 1995). This group is a sequence of gray limestone with interbedded maroon, shale-dominated units. Three formations of the Chickamauga Group underlie Parcel G: the Witten, Bowen, and Benholt Formations. These formations are oriented in a northeasterly-southwesterly direction and dip 35° to the southeast.

3.3.2 Soils

The Anderson County Soil Survey (Moneymaker 1981) identifies 11 soil types at the three properties (AMSE, Parcel 279.01, and Parcel G). There are two soil types at AMSE, one soil type at Parcel 279.01, and 10 soil types at Parcel G. Soils at these sites formed from a variety of parent materials, including weathered limestone and shale residuum, or from local alluvial deposits. Soils in the area are composed mostly of silty and clayey materials. Surface textures are usually loamy with increasing concentrations of silts and clays in deeper soil horizons. Most soils are moderately well-drained to well-drained, and soil depths range from 4 to 21 ft below ground surface (DOE 1995). Soil reaction ranges from very strongly acid (pH 4.5 to 5.5) to mildly alkaline (pH 7.4 to 7.8). Most of these soils in the project area show evidence of moderate to severe erosion or disturbance from past agricultural use, construction, grading, and other development. Emory and Hamblen soils mapped at Parcel G experience occasional flooding (p = 0.05 to 0.5/year) for very brief duration (<2 consecutive days) from early winter to early spring (December to March).

Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops of statewide or local importance. Prime farmland is protected by the Farmland Protection Policy Act of 1981 (FPPA), which seeks "… to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmlands to nonagricultural uses…" [7 U.S.C. 4201(b)].

Four soil types that occur at two of the three DOE properties (one at AMSE and three at Parcel G) are considered prime farmland in Anderson County, Tennessee. These four soil types are Capshaw silt loam (2 to 5% slopes) at the AMSE, and Emory silt loam (0 to 4% slopes), Hamblen silt loam (0 to 2% slopes), and Tasso silt loam (2 to 7% slopes) at Parcel G.

3.4 WATER RESOURCES

3.4.1 Groundwater

The principal aquifers in the Oak Ridge area include two general hydrologic units, the Knox Aquifer and the Oak Ridge Reservation (ORR) Aquitards. The Knox Aquifer includes the Knox Group and Maynardville Limestone of the Conasauga Group. Flow in the Knox Aquifer is primarily through solution cavities and enlarged fractures. The ORR Aquitards are associated with the remaining geologic units in the area, including the Chickamauga Group that underlies Parcel G. Hydraulic conductivity and potential yield in the ORR Aquitards is generally low and highly variable, depending on the density, width, and interconnectedness of local bedrock fractures and solution cavities.

3.4.1.1 Groundwater use

Groundwater is not used for agricultural, drinking, or industrial purposes in Oak Ridge. All water users in the area obtain water directly from the Oak Ridge municipal water system. A well survey conducted for the South Campus Facility remedial investigation/feasibility study (RI/FS; DOE 1995) indicated that there were no groundwater wells that extracted water from the Chickamauga Group within a 3-mile radius of Parcel G.

3.4.1.2 Groundwater monitoring

There are no groundwater monitoring wells at the AMSE or at Parcel 279.01. No groundwater monitoring wells are located within Parcel G. Monitoring wells are located on the adjacent ORISE Scarboro Operations Site. A 1991 site investigation of the Scarboro Operations Site identified a small

trichloroethene (TCE) plume in the groundwater near a mechanical shop. This plume does not affect Parcel G because it is located on the adjacent property. The South Campus Facility RI/FS (DOE 1995) concluded that the site posed no unacceptable risk to humans or the environment, provided that groundwater is not used for human consumption. It was anticipated that the TCE in groundwater would naturally attenuate and, therefore, no remedial action was considered necessary. Groundwater samples are collected biannually from five locations specified in the record of decision for the South Campus Facility. In addition, a statement was added to the property title at the Anderson County Courthouse notifying potential property owners to the contamination. Groundwater samples are analyzed for TCE, associated degradation products, and physical and chemical biodegradation indicators. Preliminary interpretations of the existing data indicate a strong likelihood that TCE is degrading in the subsurface (DOE 2001a).

3.4.2 Surface Water

There are no surface water features at the AMSE. Storm water runoff from the AMSE drains to the southwest into a wet-weather conveyance south of the museum parking lot and the city of Oak Ridge's storm sewer system, which both eventually discharge into East Fork Poplar Creek.

There are no surface water features at Parcel 279.01. Storm water runoff from Laboratory Road drains to the north into a wet-weather conveyance that eventually discharges into Ernie's Creek, which in turn discharges into the Clinch River.

Surface water resources at Parcel G include Scarboro Creek, an intermittent stream, and three old farm ponds. Storm water runoff from Parcel G and portions of Bethel Valley Road, South Illinois Avenue [state route (SR) 62], drains into Scarboro Creek, which discharges into the Scarboro Creek embayment, a 20-acre arm of Melton Hill Lake (Clinch River).

Scarboro Creek is a perennial stream that rises in Union Valley, about 1.5 miles north of the site. The stream develops on the south slopes of Pine Ridge, flows through the water gap along South Illinois Avenue (SR 62), and then opens into the Scarboro Creek embayment. Scarboro Creek flows for about 768 ft across Parcel G. During base flow conditions the creek is about 10 ft wide and 0.5 ft deep. The watershed of Scarboro Creek covers about 640 acres. Estimated mean annual discharge in Scarboro Creek is about 13 gal/second/mile^2. Stream flow is sustained by groundwater during the dry periods, making Scarboro Creek a gaining stream in the vicinity of Parcel G.

There is an unnamed, intermittent tributary to Scarboro Creek on Parcel G. This stream drains the south side of Chestnut Ridge, north of Bethel Valley Road and South Illinois Avenue, and enters Parcel G on the eastern edge of the site. The stream then flows about 576 ft before it discharges into Scarboro Creek.

The three old farm ponds were originally built to treat waste from swine housed at Parcel G. These ponds were designated as Swine Waste Ponds 1, 2, and 3. Numerical designations represent the sequence in which the ponds received waste from the swine barns. Waste first entered Pond 1, which was connected by underground drain line to Pond 2, which was connected to Pond 3. These ponds have not been used to treat swine waste since 1965. Pond 1 has a surface area of about 0.47 acre and a maximum depth of about 20 ft. Pond 2 has a surface area of about 0.38 acre and a range in depth of 5 to 10 ft. Pond 3 is about 0.56 acre and close to the same depth as Pond 2; however, Pond 3 is rarely inundated and has developed as a small wetland.

3.4.2.1 Surface water monitoring and quality

As part of the South Campus Facility RI/FS (DOE 1995), 18 surface water samples were collected from 10 locations along Scarboro Creek. Six sampling locations were within the site, one location was just north of Bethel Valley Road, and three locations were upstream within the UT Arboretum.

No volatile organic compounds (VOCs) were detected, but one location (SCF1-24) was found to contain polychlorinated pentaphenyl compounds using immunoassay field screening. Semivolatile organic compounds (SVOCs) [primarily polycyclic aromatic hydrocarbons (PAHs)] were detected at equivalent levels within the site and in the upstream samples. The levels of PAH compounds detected are probably the result of automobile exhaust and road run-off that has petroleum products from the asphalt and engine leakage. Nine samples from within the site and four upstream samples were submitted for Neutron Activation Analysis metals screening. None of the metals detected was at an elevated level indicating any potential contamination concerns.

As part of the RI/FS investigation, surface water samples were also collected from the swine waste ponds. No VOCs, SVOCs, pesticides, or polychlorinated biphenyls were detected. Methoxychlor was detected in one surface water sample from Swine Waste Pond 1 at a concentration of 0.014 µg/L. Barium, calcium, iron, magnesium, manganese, potassium, silver, and sodium were detected in the water from all three ponds. All of the concentrations were within the range of background surface water samples collected from Scarboro Creek, upstream of the site. Aluminum and arsenic were detected in one surface water sample from Swine Waste Pond 1 at 708 µg/L and 35 µg/L, respectively.

3.5 FLOODPLAINS AND WETLANDS

3.5.1 Floodplains

Floodplains consist of mostly level land along rivers and streams that may occasionally be submerged by floodwaters.

Both the AMSE and Parcel 279.01 lie outside the published Oak Ridge flood hazard zone boundaries. The Flood Insurance Rate Maps prepared for Oak Ridge specifically exclude the ORR from evaluation, and there are no published sources of floodplain information for the portion of Scarboro Creek that flows across Parcel G. Therefore, flood stage elevations for Scarboro Creek and Parcel G were estimated using regression equations developed by the U.S. Geological Survey for small watersheds (Gamble 1983). Using this technique, the maximum flood depth for the 100-year flood was estimated at 5.32 ft above base flow.

3.5.2 Wetlands

The U.S. Army Corps of Engineers (USACE) defines wetlands as “those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (Environmental Laboratory 1987). Wetlands usually include swamps, marshes, bogs, and similar areas. In identifying a wetland, three characteristics must be present. First is the dominance of hydrophytic vegetation (plants that have morphological or physiological adaptations to grow, compete, or persist in anaerobic soil conditions). Second, hydric soils are present and possess characteristics that are associated with reducing (anaerobic or low oxygen) soil conditions. Third, wetland hydrology must be present [i.e., the site must be flooded at depths 6.6 ft or saturated for sufficient duration during the growing season to create anaerobic conditions at the site] (Environmental Laboratory 1987).

There are no wetlands associated with the AMSE property or with Parcel 279.01. Parcel G and the adjacent DOE property to the south support a palustrine emergent/scrub-shrub wetland system along Scarboro Creek totaling approximately 3.4 acres. All wetlands identified at Parcel G exhibited positive field indicators of the wetland criteria: hydrophytic plants, hydric soils, and wetland hydrology. The majority of these wetlands are associated with the floodplain of Scarboro Creek, the Scarboro Creek embayment (part of Melton Hill Reservoir), and two beaver ponds in Scarboro Creek immediately south of Parcel G. The wetlands within the portion of Parcel G being considered for conveyance are located along Scarboro Creek and total about 1 acre. These wetlands range in width from 5 to 30 ft and flank the creek as it crosses the parcel. Wetland vegetation consists of persistent and nonpersistent, herbaceous, and wetland shrubs. Periodic flooding of Scarboro Creek and numerous groundwater seeps controls wetland hydrology.

Parts of Swine Waste Pond 2 and all of Swine Waste Pond 3 have developed characteristics of wetlands and could be regulated as waters of the state. Although they were originally created to treat swine waste, that function ceased decades ago when animal research operations ended at Parcel G. Since that time, the ponds have maintained their hydrologic status and now support wetland vegetation. Both ponds now function as isolated wetlands. This is especially true of Pond 3, which has developed as a periodically inundated wetland dominated by persistent and nonpersistent emergent wetland plants. Additional information about the wetlands on Parcel G and the adjacent DOE property is contained in a Wetlands Assessment prepared for the proposed action (Appendix C).

3.6 ECOLOGICAL RESOURCES

3.6.1 Terrestrial Habitat

The Oak Ridge area provides a variety of habitat types that support a large number of animals and plant species. Habitat types at the AMSE and Parcel 279.01 are somewhat limited due to their small size and location in developed parts of Oak Ridge. Parcel G is larger and has a much richer assemblage of habitats.

Terrestrial habitat at the AMSE consists of mowed lawns with scattered trees in a park-like setting that surrounds the museum building and parking lot. Terrestrial habitat at Parcel 279.01 consists of a mixture of grasses and common lawn weeds that are periodically mowed. A small grove of trees occupies the northern corner of the site. Terrestrial habitat types at Parcel G consist primarily of fields and pastures, scrub thickets, and mixed hardwood-redcedar woodlands. Fields and pastures are open areas dominated by grasses such as broomsedge (*Andropogon virginicus*), fescue (*Festuca* spp.), blue grass (*Poa* spp.), and orchard grass (*Dactylis glomerata*) and common lawn and field weeds. Fields and pastures are actively maintained in their open state by periodic mowing.

Scrub thickets occur in old fields and pastures that have not been mowed for a decade or more. After mowing ceased, these areas were invaded by woody shrubs and small trees, which form dense thickets. Dominant shrubby species are autumn-olive (*Elaeagnus umbellata*), Tatarian bush honeysuckle (*Lonicera tatarica*), and multiflora rose (*Rosa multiflora*).

Upland mixed hardwood-redcedar woods occur in old fields and animal enclosures that have been abandoned and not mowed for 20 years or more. These forests are found in mesic to dry upland areas dominated by black locust (*Robinia pseudoacacia*), sassafras (*Sassafras albidum*), black cherry (*Prunus serotina*), persimmon (*Diospyros virginiana*), and eastern redcedar (*Juniperus virginiana*).

3.6.2 Terrestrial Animals

The available habitat at the AMSE, Parcel 279.01, and Parcel G supports a moderately diverse group of animals. More data are available for Parcel G because it was part of the South Campus Facility RI/FS (DOE 1995).

Animal species at AMSE are somewhat limited by the small amount of habitat available at the site. Although no specific species lists for AMSE are available, wildlife species that would be expected to occur at AMSE are those species typically found in urban settings. This would include mammals such as the gray squirrel (*Sciurus caroliniensis*), chipmunk (*Tamias striatus*), cottontail rabbit (*Sylvilagus floridanus*), striped skunk (*Mephitis mephitis*), groundhog (*Marmota monax*), and gray fox (*Urocyon cinereoargenteus*). Birds commonly found in urban areas of Oak Ridge are the northern cardinal (*Cardinalis cardinalis*), robin (*Turdus migratorius*), eastern bluebird (*Sialia sialis*), tufted titmouse (*Baeolophus bicolor*), black-capped-chickadee (*Poecile carolinensis*), song sparrow (*Melospiza melodia*), northern mockingbird (*Mimus polyglottos*), common grackle (*Quiscalus quiscala*), starling (*Sturnus vulgaris*), American crow (*Corvus brachyrhynchos*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), rock dove (*Columba livia*), mourning dove (*Zenaida macroura*), Canada goose (*Branta canadensis*), northern flicker (*Colaptes auratus*), red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), blue jay (*Cyanocitta cristata*), and eastern towhee (*Pipilo erythrophthalmus*).

Habitat at Parcel 279.01 is similar, in many ways, to that found at the AMSE. Therefore, one could expect to see the same types of animals at Parcel 279.01 that would be expected to occur at the AMSE.

Parcel G covers a much larger area and has more habitat types than are available at the AMSE or at Parcel 279.01. Animals that may inhabit Parcel G include small mammals such as the white-footed mouse (*Peromyscus leucopus*), chipmunk, gray squirrel, cottontail rabbit, golden mouse (*Ochrotomys nuttalli*), and short-tail shrew (*Blarina brevicauda*), as well as the red fox (*Vulpes vulpes*), gray fox, striped skunk, groundhog, coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), cotton rat (*Sigmodon hispidus*), eastern harvest mouse (*Reithrodontomys humulis*), and beaver (*Castro canadensis*).

Parcel G also provides habitat that can support a variety of bird species including most of the species listed above for the AMSE and Parcel 279.01. Other species that would likely be found at Parcel G are the Kentucky warbler (*Oporornis formosus*), ovenbird (*Seiurus aurocapillus*), brown thrasher (*Toxostoma rufum*), rufous-sided towhee (*Pipilo erythrophthalmus*), Carolina wren (*Thryothorus ludovicianus*), eastern meadowlark (*Sturnella magna*), belted kingfisher (*Ceryle alcyon*), great blue heron (*Ardea herodias*), indigo bunting (*Passerina cyanea*), turkey (*Meleagris gallopavo*), quail (*Colinus virginianus*), woodcock (*Philohela minor*), and Canada goose. Birds of prey that may nest or hunt at Parcel G are the red-tailed hawk (*Buteo jamaicensis*), broad-winged hawk (*Buteo platypterus*), great horned owl (*Bubo virginianus*), screech owl (*Otus asio*), barred owl (*Strix varia*), osprey (*Pandion haliaetus*), and Cooper's hawk (A*ccipiter cooperii*).

Reptiles and amphibians that may inhabit Parcel G include the chorus frog (*Pseudacris triseriata*), tree frog (*Hyla versicolor*), spring peeper (*Hyla crucifer*), green frog (*Rana clamitans*), toad (*Bufo* spp.), various salamanders (*Eurycea* spp. and *Desmognathus* spp.), eastern box turtle (*Terrapene carolina*), northern copperhead (*Agkistrodon contortix*), black rat snake (*Elaphe obsolete*), and fence lizard (*Sceloporus undulates*).

3.6.3 Aquatic Resources

Information on the aquatic resources in Scarboro Creek, in the vicinity of Parcel G, is limited. However, Table 3.1 presents the results of fish sampling that has been conducted by ORNL during spring 1999–2001.

Table 3.1. Fish species, density (individuals/m^2), and biomass (g fish/m^2) at Scarboro Creek for spring 1999–2001

Species	2001	2000	1999
Largescale stoneroller (*Campostoma oligolepis*)	0.35		0.16
	(3.70)		(0.92)
Spotfin shiner (*Cyprinella spiloptera*)			0.02
			(0.07)
Blacknose dace (*Rhinichthys atratulus*)	0.04	0.07	0.01
	(0.19)	(0.78)	(0.07)
Yellow bullhead (*Ameiurus natalis*)			0.03
			(0.74)
Banded sculpin (*Cottus carolinae*)	0.28	0.74	1.01
	(2.01)	(3.58)	(4.74)
Green sunfish (*Lepomis cyanellus*)	0.01	0.09	0.05
	(0.16)	(1.25)	(0.74)
Log perch (*Percina caprodes*)			0.04
			(0.48)
Species richness	4	3	7
Total density	0.68	0.90	1.33
Total biomass	6.06	5.61	7.91

Source: Personal communication from Michael Ryan, Environmental Sciences Division, Oak Ridge National Laboratory, to Jimmy Groton, Science Applications International Corporation, December 5, 2001.

Although two of the former swine waste ponds located on Parcel G contain water throughout most of the year, aquatic resources are generally limited. Typical biota is likely to include frogs, turtles, crayfish, and aquatic insects such as dragonflies, damselflies, and aquatic beetles. Due to temperature extremes, high biological oxygen demand, and the isolated nature of the ponds it is unlikely that the ponds contain any fish.

3.6.4 Threatened and Endangered Species

Table 3.2 lists animal species known to be present on the ORR (excluding the Clinch River bordering the reservation) along with their status. Other listed species may be present, although they have not been observed recently. These include several species of mollusks, amphibians (such as the hellbender), birds (such as Bachman's sparrow), and mammals (such as the smoky shrew). The federally threatened bald eagle is increasingly seen in the winter and may well begin nesting on the ORR within a few years (DOE 2006). Bald eagles have not been sighted in the vicinity of the AMSE, Parcel 279.01, or Parcel G. Similarly, several state-listed bird species, such as the anhinga, olive-sided flycatcher, double-crested cormorant, and little blue heron are currently uncommon migrants or visitors to the ORR; however, the double-crested cormorant and little blue heron are increasing or will probably increase in numbers. Others, such as the cerulean warbler, northern harrier, great egret, and yellow-bellied sapsucker, are migrants or winter residents that do not nest on the reservation. The golden-winged warbler (*Vermivora chrysoptera*), listed by the state as in need of management, has been sighted on the ORR. The spotfin chub (*Cyprinella monnacha*) has been sighted and collected in the city of Oak Ridge and is possibly present on the ORR (DOE 2006). None of these species have been reported in the vicinity of the AMSE, Parcel 279.01, or Parcel G.

Table 3.2. Animal species of concern reported from the ORR[a]

Species		Legal status[b]	
		Federal	State
	Fish		
Phoxinus tennesseenis	Tennessee dace		D
	Amphibians and reptiles		
Hemidactylium scutatum	Four-toed salamander		D
	Birds		
Accipiter striatus	Sharp-shinned hawk		D
Anhinga anhinga	Anhinga		D
Ardea alba	Great egret		D
Circus cyaneus	Northern harrier		D
Contopus cooperi	Olive-sided flycatcher		D
Dendroica cerula	Cerulean warbler		D
Egretta caerulea	Little blue heron		D
Egretta thula	Snowy egret		D
Falco peregrinus[c]	Peregrine falcon		E
Haliaeetus leucocephalus[d]	Bald eagle	T	D
Lanius ludovicianus	Loggerhead shrike		D
Pooecetes gramineus	Vesper sparrow		D
Sphyrapicus varius	Yellow-bellied sapsucker		D
Tyto alba	Barn owl		D
Vermivora chrysoptera	Golden-winged warbler		D
	Mammals		
Myotis grisecens	Gray bat	E	E
Sorex longirostris	Southeastern shrew		D

[a]Land and surface waters of the ORR exclusive of the Clinch River, which borders the ORR.
[b]E = endangered, T = threatened, D = deemed in need of management.
[c]The peregrine falcon was federally delisted on August 25, 1999.
[d]The bald eagle was proposed for federal delisting on July 6, 1999.

There are currently 22 plant species listed by the state of Tennessee as threatened or endangered that have been observed in the last 10 years on the ORR; among them are the pink lady's slipper and Canada lily (Table 3.3). Two species occurring on the ORR, Carey's saxifrage and the purple fringeless orchid, have been removed from the state list as of November 1999 (DOE 2006).

The AMSE and 279.01 parcels are routinely mowed and maintained and are, thereby, unlikely to provide suitable habitat for any rare plants. In June 1993, Energy Systems conducted a rare plant survey at the South Campus Facility that includes Parcel G. No federal- or state-listed plant species were encountered during that survey.

DOE contacted the U.S. Fish and Wildlife Service (FWS) to inform them about the proposed action and to obtain the latest information on federally listed threatened and endangered species in the area of each of the parcels. According to FWS records, the gray bat (*Myotis grisescens*), and Indiana bat (*Myotis sodalis*), both federally listed endangered species, may occur on or near Parcel G. The FWS also recommended that a biological assessment be conducted to assess potential impacts and determine if the proposed action may affect the two bat species. They also recommended that permanent protection measures (e.g., conservation easements) for Scarboro Creek and associated wetlands on Parcel G be incorporated into any legal instrument conveying the property to the city of Oak Ridge. Additional information on the gray bat and Indiana bat is presented in the biological assessment prepared for the proposed action (Appendix D).

Table 3.3. Vascular plant species reported from the ORR listed by state or federal agencies

Species	Common name	Habitat on ORR	Status code[a]
Aureolaria patula	Spreading false-foxglove	River bluff	T
Carex gravida	Heavy sedge	Varied	S
Carex oxylepis var. pubescens[b]	Hairy sharp-scaled sedge	Shaded wetlands	S
Cimicifuga rubifolia	Appalachian bugbane	River slope	T
Cypripedium acaule	Pink lady's-slipper	Dry to rich woods	E-CE
Delphinium exaltatum	Tall larkspur	Barrens and woods	E
Diervilla lonicera	Northern bush-honeysuckle	River bluff	T
Draba ramosissima	Branching whitlow-grass	Limestone cliff	S
Elodea nuttallii	Nuttall's waterweed	Pond, embayment	S
Fothergilla major	Mountain witch-alder	Woods	T
Hydrastis canadensis	Golden seal	Rich woods	S-CE
Juglans cinerea	Butternut	Slope near stream	T
Juncus brachycephalus	Small-head rush	Open wetland	S
Lilium canadense	Canada lily	Moist woods	T
Lilium michiganense[c]	Michigan lily	Moist woods	T
Liparis loeselii	Fen orchid	Forested wetland	E
Panax quinquifolius	Ginseng	Dry, open woods	S-CE
Platanthera flava var. herbiola	Tuberculed rein-orchid	Wetland	T
Populus grandidentata[d]	Large-tooth aspen	Dry, woodlands	S
Ruellia purshiana	Push's wild-petunia	Boggy wetland	S
Scirpus fluviatilis	River bulrush	Rocky river bluffs	S
Spiranthes lucida	Shining ladies-tresses	Rocky woods	T
Thuja occidentalis	Northern white cedar	Rocky river bluffs	S
Viola tripartita var. tripartita	Three-parted violet	Rocky woods	S

[a]Status codes:
E = Endangered in Tennessee.
T = Threatened in Tennessee.
S = Special concern in Tennessee.
CE = Status due to commercial exploitation.
[b]*Carex oxylepis var. pubescens* has not been located during recent surveys.
[c]*Lilium michiganense* is believed to have been extirpated from the ORR by the impoundment at Melton Hill.
[d]*Populus grandidentata* was reported in two ORR locations. One of the reports was confirmed, but the tree died during the year.

3.7 CULTURAL RESOURCES

Cultural resources are defined as any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet any one of the National Register Criteria for Evaluation (NRCE) (36 *CFR* Part 60.4), they may be termed historic properties and, thereby, are potentially eligible for inclusion on the National Register of Historic Places (NRHP).

No intact cultural resources are known to be present or thought to exist on the AMSE property and Parcel 279.01. This is based on the highly disturbed nature of the properties and their location within the city of Oak Ridge. Also, the AMSE itself does not meet the NRCE and, thus, is not yet considered to be an historic property. The original location of the museum was the building at 55 Jefferson Avenue. Although the current AMSE facility does not meet the NRCE, historic and scientific artifacts and archives of the ORR contained within the museum would remain in the ownership of the Federal Government.

The DOE-ORO, Tennessee State Historic Preservation Office (TN-SHPO), and the Advisory Council on Historic Preservation ratified a Memorandum of Agreement (MOA) in 2003 regarding the site

interpretation of the East Tennessee Technology Park (ETTP). Two parts of the MOA have an impact on the AMSE. The first is that although DOE currently owns AMSE, in the event of a transfer of ownership, the subsequent owner would be offered the opportunity to become a signatory to the MOA. They would also have first right of refusal for the curation of historic artifacts recovered from the ETTP. The second item in the MOA that affects AMSE is that the museum has the lead role in overseeing DOE ORR oral history interviews, and they will serve as the central point of contact for conducting these interviews and may serve as the potential repository for tapes and transcripts of ORR oral histories.

Based on previous disturbances from activities associated with the ORISE Scarboro Operations Site and past farming activities, it was thought that Parcel G did not contain any intact cultural resources. However, because this area had not been previously surveyed and some potential did exist for cultural resources to be present, DOE conducted an archaeological survey of the area. Based on the survey findings and research at the Tennessee Division of Archaeology and the Tennessee Historical Commission, DOE has determined that no historic properties would be affected by the proposed action. It was also determined that the proposed action would have no impact on any site or property included in the NRHP pursuant to 36 *CFR* 60.4 and no further archaeological investigations were recommended. DOE notified the TN-SHPO of the proposed undertaking and its determination of effect to comply with Sect. 106 of the National Historic Preservation Act of 1966 (NHPA).

3.8 SOCIOECONOMICS

The region of influence (ROI) for this analysis includes Anderson and Roane counties. The region includes the cities of Clinton, Oak Ridge, Harriman, and Kingston. Because the parcels of land involved are small and are located within the city of Oak Ridge, it is assumed that the primary impacts will affect the city and nearby populations. To generate the most conservative estimates of potential impact, the ROI includes only these two counties. Actual impacts may be distributed over a wider area, because Anderson County is also part of the Metropolitan Statistical Area for the much larger city of Knoxville and draws commuters from at least 12 counties in eastern Tennessee (Juan 2000).

3.8.1 Demographic and Economic Characteristics

Table 3.4 summarizes population, per capita income, and wage and salary employment from 1999 to 2004. Population has increased slightly over the 5-year period, with Roane County accounting for most of the growth. Employment for the region declined from 74,997 in 1999 to 72,299 in 2004. Per capita income grew from $22,778 to $27,518 over the same period (Bureau of Economic Analysis 2006).

Table 3.4. Demographic and economic characteristics: Anderson and Roane counties

County	1999	2000	2001	2002	2003	2004	Annual growth 1999–2004 (%)
			Anderson				
Population	71,454	71,293	71,444	71,664	71,909	72,045	0.16
Per capita income ($)	24,001	25,035	25,988	26,798	27,664	28,588	3.56
Total employment	50,387	50,961	50,975	50,601	51,907	51,693	0.51
			Roane				
Population	51,736	51,954	51,976	52,225	52,487	52,781	0.40
Per capita income ($)	21,091	22,339	22,638	23,936	24,949	26,051	4.31
Total employment	24,610	23,798	20,953	20,975	20,847	20,606	-3.49
			Region Totals				
Population	123,190	123,247	123,420	123,889	124,396	124,826	0.26
Per capita income ($)	22,778	23,903	24,583	25,587	26,512	27,518	3.85
Total employment	74,997	74,759	71,928	71,576	72,754	72,299	-0.73

***Source*:** Bureau of Economic Analysis 2006.

3.8.1.1 Distribution of minority and economically disadvantaged populations for environmental justice concerns

Table 3.5 shows the distribution of minority populations in the city of Oak Ridge. For the purposes of this analysis, a minority population consists of any census tract in which minority representation is greater than the national average of 30.7%. Minorities include individuals classified by the U.S. Bureau of the Census as Black or African-American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Hispanic or Latino, and those classified under "Two or more races." This provides a conservative estimate consistent with recent OMB guidance (OMB 2000). Hispanics may be of any race and are excluded from the totals for individual races to avoid double counting.

Table 3.5. Race or ethnic distribution for Oak Ridge City population: 2000

Race or ethnic group	Number	Percent
Not Hispanic or Latino		
White	23,517	85.9
Black or African American	2,229	8.1
American Indian or Alaska Native	81	0.3
Asian	568	2.1
Native Hawaiian and Other Pacific Islander	6	0.0
Some other race	30	0.1
Two or more races	427	1.6
Hispanic or Latino[a]	529	1.9
Total	27,387	100.0

[a]May be of any race. Those classified as Hispanic or Latino are excluded from other categories to avoid double counting.

Source: Bureau of the Census 2000.

As of the 2000 Census, minorities represented 14.0% of the total Oak Ridge population, compared to the national average of 30.7%. Only the Scarboro Community in tract 201 included a minority population greater than the national average. African-Americans comprised 29.6% of the population in tract 201, and other minorities (including two or more races) comprised 10.5%. For all other tracts in the area, minorities comprised 20% or less of the population. For comparison, minorities represented 21.0% of the

population in Tennessee (Bureau of the Census 2000). No federally recognized Native American groups live within 80 km (50 miles) of the proposed site.

According to the 2000 Census, 12.4% of the U.S. population and 13.5% of the Tennessee population had incomes below the poverty level in 1999 (Bureau of the Census 2000). In this analysis, a low-income population consists of any census tract in which the proportion of individuals below the poverty level exceeds the national average. Within the ROI, 13.1% of the population in Anderson County had incomes below the poverty level in 1999. The proportion in Roane County was 13.9%. Within Oak Ridge, low-income populations were located in census tracts 201 (15.8% below poverty level) and 205 (27.9%). Tract 201 roughly corresponds to the Scarboro community, and tract 205 includes the area between Oak Ridge Turnpike and West Outer Drive, bounded on the west by Louisiana Avenue and on the east by Highland Avenue and Robertsville Road. In other Oak Ridge census tracts, the percentages ranged from 12.1% in tract 204 to 1.9% in tract 301 (Bureau of the Census 2000).

3.8.2 Fiscal Characteristics

Oak Ridge City general fund revenues and expenditures for FY 2005, projections for 2006, and budgeted revenues and expenditures for FY 2007 are presented in Table 3.6. The general fund supports the ongoing operations of local governments as well as community services, such as police protection and parks and recreation. The largest revenue sources have traditionally been local taxes (which include taxes on property, real estate, hotel/motel receipts, and sales) and intergovernmental transfers from the federal or state government. Nearly 95% of the 2005 general fund revenue came from these combined sources (City of Oak Ridge 2006). For FY 2006, the property tax rate was $2.55 per $100 of assessed value. The assessment rate is 40% for industrial and commercial property and 25% for residential property (City of Oak Ridge 2006). The city also receives a payment-in-lieu-of-tax (PILT) for ORR acreage that falls within the city limits. The payment is based on its value as farmland, and assessed at the farmland rate of 25% (City of Oak Ridge 2005). In 2006, the payment was based on a value of $6,450 per acre (Hunter 2006).

Table 3.6. City of Oak Ridge revenues and expenditures, FY 2005 and budgeted FY 2007 ($)

	2005 Actual	2006 Projected	2007 Budgeted
Revenues			
Taxes	19,915,688	20,076,565	20,933,810
Licenses and permits	340,802	389,500	220,000
Intergovernmental revenues	10,574,555	11,482,459	11,771,300
Charges for services	388,577	336,500	346,000
Fines and forfeitures	238,503	265,000	289,000
Other revenues	527,689	553,000	558,500
Total revenues	31,985,814	33,103,024	34,118,610
Expenditures and other financing			
Expenditures	(14,737,841)	(17,690,181)	(16,326,766)
Other financing uses[a]	(17,503,411)	(17,931,145)	(18,997,273)
Total expenditures and other financing	(32,241,252)	(35,621,326)	(35,324,039)

[a]Includes items such as capital projects fund, solid waste fund, economic diversification fund, debt service, and schools.
Source: City of Oak Ridge 2006.
FY = Fiscal year.

3.9 INFRASTRUCTURE AND SUPPORT SERVICES

3.9.1 Transportation

The AMSE and Parcel 279.01 are well serviced by existing roads within the city of Oak Ridge. The main entrance to the AMSE is from South Tulane Avenue, but it can also be accessed from Badger Avenue. Parcel 279.01 is located on the corner of Laboratory Road and Administration Road.

Road access to Parcel G is more limited. The property is currently accessed from Pumphouse Road using a gravel service road that is part of the ORISE Scarboro Operations Site. Limited access also exists from Bethel Valley Road. This access is through a gate located on Bethel Valley Road just east of the intersection of Pumphouse and Scarboro Roads. A gravel DOE access road begins at the gate and runs along the northern border of Parcel G parallel with the Bethel Valley Road right-of-way (ROW) and fence. This DOE access road also connects with the ORISE Scarboro Operations Site gravel service road. Additional limited access is located off of Pumphouse Road along a mowed ROW that follows the fence for the Scarboro Cemetery. A cable gate currently controls access to this ROW.

3.9.2 Utilities

The AMSE obtains electricity, water, and sewer from the city of Oak Ridge. AMSE's main building has an all-electric, damper-controlled heating, ventilating, and air-conditioning system that is more than 25 years old. These same services are also available for Parcel G and Parcel 279.01.

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4. ENVIRONMENTAL CONSEQUENCES

4.1 LAND AND FACILITY USE

4.1.1 Proposed Action

Under the proposed action, the present land use of each parcel would change over time as development occurs. Buildings and other structures would be constructed to support various commercial and light industrial uses. The visual character of portions of the parcels would change from a more natural to a more man-made looking environment as development progressed. Development would still have to be compatible with local zoning requirements and would be subject to all local, state, and federal environmental laws and regulations.

For bounding purposes, it is assumed that the large, open area between Tulane Place and South Illinois Avenue on the AMSE property would be developed for a mix of commercial uses. No major changes are expected for the AMSE facility and parking area. The open area in back of the museum could be developed for various commercial uses such as expansion of the city's municipal complex, additions to the museum facility, or professional offices. The area could also remain as an open space so that it could continue to be used for various outdoor events.

Because of the small size of Parcel 279.01, it is assumed for purposes of analysis that development on this parcel would be for a small retail business or office building. This parcel could also be used by the adjoining office supply business for expansion.

It is assumed that Parcel G would be developed for light industrial use or a mix of commercial and industrial use. Constraints on the property, such as Scarboro Creek and access, may limit the actual uses. For bounding purposes it is assumed that an approximately 50,000- to 100,000-ft^2 building would be built along with supporting infrastructure and utilities for a small processing or manufacturing business. However, potential development on Parcel G could also be a small office park.

4.1.2 No Action

Under the no action alternative, current land use at the AMSE would continue until sometime in the future when, due to the lack of continued funding, the museum could be forced to limit hours of operation or close. Parcel G and Parcel 279.01 would remain DOE property and their current land use would remain unchanged until their future disposition could be decided (see Sect. 2.2).

4.2 AIR QUALITY

4.2.1 Proposed Action

Emissions from vehicle and equipment exhaust, and fugitive dust from vehicle traffic and disturbance of soils resulting from development activities on any of the parcels, are not expected to adversely affect local air quality. These emissions would include carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10} (inhalable particulate matter with particles less than 10 μm in diameter), and hydrocarbons. Emissions of particulate matter would consist primarily of airborne soil. Emissions from site preparation and construction would be short-term, sporadic, and localized (except for emissions associated with the personal vehicles of construction workers and vehicles transporting construction materials and equipment). Dispersion would

decrease concentrations of pollutants in the ambient air as distance from the construction site increased. Increments of pollutants due to workers' vehicles and construction vehicles and equipment would not be expected to cause any exceedance of primary or secondary NAAQS.

Not all of the area available for construction would be under construction at any one time. Rather, earthwork would likely be undertaken in increments, with the first phase being excavation for utility installation, road construction and upgrading, and grading/contouring. Increases in PM_{10} concentrations due to fugitive dust from excavation and earthwork would probably be noticeable at each site and in the immediate vicinity, and ambient concentrations of particulate matter could rise in the short-term. However, control measures for lowering fugitive dust emissions (i.e., covers and water or chemical dust suppressants) would minimize these emissions.

Use of newly developed areas within each parcel could result in minor increases of air pollutant emissions primarily from the combustion of natural gas and diesel fuel. However, the types of commercial/industrial uses likely to be developed would not result in the kind of major air emissions produced by heavy industries. Air emissions that might be generated by a small manufacturing or processing facility located on Parcel G would be expected to be like those generated from similar operations located in the Bethel Valley Industrial Park located nearby. These emissions would not exceed the NAAQS, have an adverse impact on air quality, or be detrimental to human health. If applicable, facilities would be required to obtain the appropriate permits, and operating emissions would be limited. Sulfur dioxide emissions from sources in and around each parcel are expected to be low, and the types of development likely to occur are not expected to cause any exceedance of allowable PSD increments.

4.2.2 No Action

Under the no action alternative, air pollutants would continue to be emitted at current rates in the vicinity of each parcel, with the largest source being vehicle traffic. Vehicle emissions at the baseline level would continue to be a source of ozone in the surrounding area.

4.3 GEOLOGY AND SOILS

4.3.1 Proposed Action

Site clearing, grading, and contouring could alter the topography of the land parcels that could be developed under the proposed action, but the geologic formations underlying those sites should not be affected by proposed development. Construction would disturb soils, and some topsoil might be removed in the process. Topsoil would be replaced after buildings and roads were completed, and unpaved areas would be landscaped.

The FPPA requires federal agencies to consider the effects of any activity that would convert farmland. The Natural Resource Conservation Service identifies four soil types that occur at AMSE and Parcel G as prime farmland (one at AMSE and three at Parcel G).

Normally, a Farmland Conversion Impact Rating would be completed to rate the relative impact of the proposed action. The rating form is based on a Land Evaluation and Site Assessment (LESA) system, which measures the quality of farmland based on soil quality and other factors that would affect a farm's viability. No LESA was completed for the proposed action because the definition of prime farmland specifically excludes from consideration lands committed to urban development. All three parcels under consideration lie within the city of Oak Ridge and have been zoned to include nonagricultural uses

(i.e., commercial, industrial, or residential use). Therefore, all three parcels are exempt from consideration as prime farmland.

4.3.2 No Action

No impact to the local geology and soils of the Oak Ridge area is expected to occur under the no action alternative. Both the AMSE and Parcel 279.01 property are free from contamination. Remediation activities at the ORISE Scarboro Operations Site were completed several years ago, and the area has been in post-remediation monitoring since that time. It is unlikely that other environmental restoration actions would occur near Parcel G. The possibility exists for other environmental restoration actions to occur at other areas in the Scarboro Creek watershed. However, the extent of these activities has not been determined. Environmental restoration activities at ORR are evaluated on a case-by-case basis and conducted in accordance with the CERCLA review and documentation process (i.e., RI/FS).

4.4 WATER RESOURCES

4.4.1 Proposed Action

The greatest potential impact to surface waters would originate from soil erosion, runoff, and sedimentation (during construction); a fuel, hazardous material, or waste spill; or a sewer line leak (during construction and operation of facilities). Although two of the properties (AMSE and Parcel 279.01) do not have any surface water features, all are connected to surface water resources by local storm sewers or wet-weather conveyances. The AMSE, by storm drains to East Fork Poplar Creek and Parcel 279.01, is connected by wet-weather conveyances to Ernie's Creek. Parcel G has Scarboro Creek, an unnamed creek, and three small ponds. Any construction activities that would directly occur in these surface waters may require that the appropriate permits be obtained prior to any disturbance. Uncontrolled soil erosion would increase sedimentation and turbidity in the receiving surface waters.

Spills of fuel, hazardous material, or waste, or a sewer line leak, could have adverse impacts on surface waters if not controlled or contained. Impacts would primarily be a change to the water quality (pH, dissolved oxygen, conductivity, etc.) that could affect vegetation and aquatic biota. Soil erosion impacts would be mitigated through the use of best management practices (BMPs) (i.e., silt fences, straw bales, and temporary sediment detention basins). The potential for spills would be mitigated through the adherence to proper safety procedures and spill prevention plans. In the event of a spill from an accident, spill response measures (e.g., booms, berms, sorbents, neutralizers, secondary containment, and mechanical removal equipment) would minimize potential adverse impacts. Changes in surface topography during construction could lead to the alteration of local hydrology.

Paving large areas for roads and parking lots could substantially reduce water infiltration, potentially affecting on-site surface water features. Construction of new facilities could require state storm water runoff permits. Wastewater from industrial and commercial operations would be pretreated (if required) and discharged to the city of Oak Ridge sewage treatment plant according to discharge permit restrictions. Impacts from accidental spills would be addressed by individual operators through the use of safety procedures, spill prevention plans, and spill response plans. Surface water protection measures are already required by the city of Oak Ridge and TDEC and would be continued for the proposed action.

Impacts to groundwater quality could also occur as a result of a fuel or waste spill, or a sewer line leak and subsequent migration of contaminants through the soil profile to the groundwater table. A spill directly into the surface water bodies in the vicinity also could affect the groundwater quality because of the connection between surface water and groundwater resources. However, it is expected that the

quantities of materials with the potential to affect surface or groundwater (e.g., fuel) would be transported or stored at the construction sites in the proper containers and according to all applicable regulations. The use of local, state, or federal permits, safety procedures, spill prevention plans, and spill response plans in accordance with state and federal laws would minimize the severity of potential impacts from accidents. Although there are few groundwater users in Oak Ridge, institutional controls (i.e., deed restrictions) would be in place to ensure that there would be no use of groundwater resources. Use classifications for groundwater are prescribed by the Tennessee Water Control Act, T.C.A. 69-3-105(a)(2).

4.4.2 No Action

Under the no action alternative, surface and groundwater monitoring and appropriate environmental restoration measures would be continued, if needed, in the vicinity of Parcel G. Appropriate mitigation measures are considered and implemented for these activities under the CERCLA review and documentation process. Impacts to surface water or groundwater could also occur as the result of a spill or leak from ongoing operations. Surface and groundwater protection measures, such as spill prevention and spill response plans, are already in place for ongoing operations.

4.5 FLOODPLAINS AND WETLANDS

4.5.1 Proposed Action

Neither the AMSE nor Parcel 279.01 lies within floodplains or flood hazard zones; however, portions of the Scarboro Creek floodplain are present on Parcel G. For Parcel G to be included in the federal Flood Insurance Program, detailed hydrologic studies would need to be conducted to set flood hazard zones.

DOE prepared a wetlands assessment for Parcel G to meet the "Compliance with Floodplain/ Wetlands Environmental Review Requirements" (10 *CFR* 1022). DOE provided the opportunity for public review through publication of a Public Notice in the *Federal Register* [*Federal Register*: March 21, 2002 (Volume 67, Number 55)]. The assessment is also included in Appendix C.

The proposed conveyance of Parcel G would not inherently cause adverse impacts that affect the survival, quality, and natural and beneficial values of wetlands on the property because the proposed conveyance is an administrative action. Rather, the potential for, and degree of, adverse impacts would depend upon how the property was developed. Adverse impacts would include any activity that eliminates or reduces the ability of wetlands to perform their normal biological, chemical, hydrological, and physical functions. Some or all of the wetlands could potentially experience direct impacts by development in the wetlands themselves or indirect impacts from other activities associated with activities in nearby areas. Wetlands downstream from Parcel G could also be affected by any construction activities on the parcel.

Proposals for development would be subject to regulation by the USACE, TDEC, and possibly the Tennessee Valley Authority (TVA). Proposed projects would be required to follow normal sequencing during regulatory review to avoid and minimize adverse impacts to wetlands at Parcel G. Compensatory mitigation should be used as a last resort and would be subject to negotiation between USACE, TDEC, and possibly DOE, and TVA.

4.5.2 No Action

No additional impacts to floodplains or wetlands are expected to occur under the no action alternative.

4.6 ECOLOGICAL RESOURCES

4.6.1 Proposed Action

Development in the land parcels proposed for conveyance would have direct impacts on terrestrial and aquatic habitats, plants, and animals present at these sites. Potential adverse impacts to aquatic resources could also occur unless they are avoided and mitigation measures are implemented. Conveyance of the AMSE and Parcel 279.01 would have negligible adverse impacts because these sites are in intensively developed portions of Oak Ridge with marginal available habitat and limited biota located at those sites. Adverse impacts would be most pronounced at Parcel G, which has much more natural habitat and more diverse biota.

Proposed construction and development of Parcel G would have an impact on terrestrial habitats at Parcel G. Habitat loss would include areas of managed grassland, mixed hardwood-redcedar riparian forest, and scrub thickets.

The impact of construction would include direct mortality or injury to some biota and elimination or degradation of the impacted habitat. The most likely impact would be the elimination of one or more fragmented terrestrial areas or narrowing of areas already squeezed by activities at the site. The elimination or narrowing of terrestrial communities would have a minimal impact on existing plant or animal species. The animal and plant species that occur on the three parcels are common in the Oak Ridge area and some of the larger more mobile animals could relocate to adjacent habitat of the same structure. Minimizing the amount of earth-moving activities would reduce the effects on plants and terrestrial habitats. Blending construction with the natural setting of the area would result in fewer impacts and mitigation measures.

If construction activities could not avoid direct impacts to aquatic resources, appropriate permits would be obtained prior to any disturbance. These unavoidable direct impacts would be minor and temporary because the resources that would be impacted are limited, not considered unique, and do not contain sensitive species. Indirect impacts to aquatic resources could result from an increase in flow caused by an increase in the amount of storm water runoff. Increased flow could affect the plant species, riparian habitat, and the fish and macroinvertebrate species found in the impacted creeks and drainage ditches. Larger flow volumes could scour banks and substrates of the waterways eroding plants, soil, and sediment. A decrease or change in stream substrate could lead to a reduction in the number of fish and macroinvertebrate species.

Avoiding the resource, minimizing the impact, or mitigating the impact if avoidance or minimization is not possible would address impacts to ecological resources. Impacts from construction would be considered short-term and minimal, and would be mitigated through the establishment of stream buffer areas and the use of BMPs (e.g., erosion controls). Natural habitat around the areas of proposed development would be left as a buffer zone between the developed areas and other undeveloped portions of the site. Areas disturbed during construction, but not needed for facilities, would be revegetated after construction is completed. The use of native species for revegetation would have a positive impact as it could enhance biotic and ecosystem diversity in the area.

Storm detention basins used to capture and treat storm water runoff would be designed and constructed to handle the additional runoff associated with any new developments. An increase in the capacity of existing storm water retention ponds and outfall structures (that control release or flow) could also minimize impacts to creeks and drainage ditches. Storm water runoff would be discharged to surface water only in accordance with limitations established under state or other regulatory permits. It may be possible that the former swine waste ponds located on Parcel G (see Sect. 3.4.2) could somehow be incorporated into the design of storm detention basins that may be required for development of the property.

Wastewater discharges would be to the existing sewage treatment plant in Oak Ridge according to discharge permit restrictions. If permit limits were consistently met, degradation of aquatic habitat would not be expected.

The potential for a spill or leak also exists from the normal operation of new and existing facilities. Impacts to biota could include direct mortality, injury, and degradation of the impacted habitat. Because of the limited habitat and biota at the site, these impacts would probably be minor to moderate, and the affected resources would be expected to recover within a few months to a year, depending on the severity of the spill or leak.

No federal- or state-listed threatened and endangered plants or animals are known to exist at any of the three parcels under evaluation. However, the FWS indicated (see Appendix A) that the federally listed endangered gray bat and Indiana bat may occur on or near Parcel G. DOE has completed a biological assessment to assess potential impacts and to determine if the proposed action may affect these species.

Based on the information presented in the biological assessment (see Appendix D), DOE concluded that the proposed action is not likely to adversely affect either of the listed species. Neither species appears likely to be present on Parcel G, and proposed or designated critical habitats for the species are not present on or near the parcel. Although no caves or other suitable hibernacula or roosting habitat for gray bats are present at Parcel G, caves that could provide potential roosting habitat for the gray bat are present within 4 miles of Parcel G. Although the ultimate use of Parcel G may eventually require the removal of trees, potential summer roosting habitat at the site is at best marginal for Indiana bats. Also, there are adequate numbers of suitable and potentially suitable roost trees available immediately adjacent to Parcel G. Scarboro Creek within Parcel G is not considered to be good foraging habitat for gray or Indiana bats because it is a narrow, small stream with limited riparian habitat. In addition, the Clinch River, Melton Hill Lake, and lower Scarboro Creek, located adjacent to Parcel G, provide additional suitable foraging habitat for both species. The FWS determined that the biological assessment is adequate and concurred with DOE's conclusion of not likely to adversely affect (see Appendix A).

4.6.2 No Action

No additional impacts to terrestrial and aquatic habitats, plants, and animals are expected to occur under the no action alternative. Parcels G and 279.01 would remain DOE property and their current land use would remain unchanged until their future disposition could be decided (see Sect. 2.2).

4.7 CULTURAL RESOURCES

4.7.1 Proposed Action

For the AMSE property and Parcel 279.01, the proposed action would not have any effect on cultural resources because it has been determined that none are likely to be present. Also, the AMSE itself does not meet the NRCE and, thus, is not yet considered to be an historic property. DOE, under the NHPA, would protect historic and scientific artifacts and archives contained within the AMSE facility. Prior to the conveyance of the museum, DOE would conduct an inventory of the items contained within the AMSE facility and make a determination on which items have cultural/historical significance and require protection. DOE would maintain ownership of those items to ensure their continued protection and preservation. DOE would enter into an agreement with the AMSE for the continued curating and display of those items. Based on the results of a Phase I archaeological survey performed on Parcel G, DOE has determined that no archaeological resources or historic properties would be affected by the proposed action. It was also determined that the proposed action would have no impact on any site or property

included in the NRHP pursuant to 36 *CFR* 60.4. The TN-SHPO concurred with DOE's determination that the project as currently proposed would not adversely affect any property eligible for listing in the NRHP (Appendix A).

DOE would include a deed restriction requiring that if an unanticipated discovery of cultural materials (e.g., human remains, pottery, bottles, weapon projectiles, and tools) or sites was made during development activities, all ground-disturbing activities in the vicinity of the discovery would be halted immediately. The DOE-ORO Cultural Resources Management Coordinator would be contacted, and consultation with the TN-SHPO would be initiated and completed prior to any further disturbance of the discovery-site area.

4.7.2 No Action

There would be no impacts on cultural resources under the no action alternative. No cultural resources are believed to be present on the AMSE property or Parcel 279.01. Based on the results of a Phase I archaeological survey performed on Parcel G, DOE has determined that no archaeological resources or historic properties are present.

4.8 SOCIOECONOMICS

4.8.1 Proposed Action

This section assesses the potential socioeconomic impacts of the land conveyance and development. This analysis assumes that development on Parcel G, Parcel 279.01, and the AMSE property would create less than 80 direct jobs. This is consistent with the ratio of estimated jobs per usable acre developed for Parcel ED-1 (Young 1999) and represents an upper bound for the purpose of analysis.

4.8.1.1 Demographics

Population. Based on the small number of jobs created, no impact on population is anticipated.

Environmental Justice. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, requires agencies to identify and address disproportionately high and adverse human health or environmental effects its activities may have on minority and low-income populations. Although current assumptions suggest there would be no high and adverse human health or environmental impacts, the actual circumstances would depend on specific choices made at the time of development. As discussed in Sect. 3.8.1.1 of the census tracts in the city of Oak Ridge, only tract 201 includes a higher proportion of minorities in the population than the national average. Other tracts in the city, and tracts closer to Parcel G, where industrial development could take place, have low proportions of minorities in their populations. In the event that adverse impacts occur, they are likely to have at least as much effect on these closer populations as on the residents of tract 201.

Similarly, some low-income populations are located within the city and near the ORR. However, these populations are scattered among higher income populations. Any adverse impacts that affect the low-income tracts are also likely to affect the higher income populations. Therefore, any adverse health and environmental impacts that may occur are not expected to have a disproportionate effect on low-income and minority populations.

4.8.1.2 Employment and income

As discussed earlier, this analysis assumes that developing the conveyed land would create less than 80 direct full-time-equivalent jobs. This figure represents a negligible increase (0.1%) from the 2004 total employment shown in Table 3.4. As an upper bound, if it is assumed that each of the newly generated direct jobs pays the projected 2006 statewide average annual manufacturing wage of $41,049 (Murray, Cunningham, Hill, and Marshall 2005), the direct impact on ROI income would be an increase of $3.3 million, or less than 0.1% of the 2004 ROI income. Actual income is likely to be less because final development is likely to include both retail and manufacturing industries, and retail jobs typically pay much less than manufacturing jobs.

Potential negative impacts include the loss of 21 jobs and associated income if fundraising efforts are unsuccessful and the Museum is forced to close. This is the same as the potential negative impact under the no action alternative.

4.8.1.3 Fiscal impacts

The main impact of the proposed conveyance is likely to be its effect on city of Oak Ridge finances, and the final impacts would depend on whether the property is conveyed to the city of Oak Ridge or to a private entity, the success of fundraising and development efforts, and whether the city chooses to fund any portion of the Museum's operations. Potential positive impacts include additional tax revenue generated by the acquisition, sale, and/or development of Parcels G and 279.01, and the undeveloped portion of the AMSE property. Potential negative impacts include any additional costs required from the city to maintain and operate the museum and the loss of the DOE in-lieu-of-tax payments on the property. If development or fundraising efforts are unsuccessful, no additional impacts are anticipated on city finances unless the city chooses to contribute toward Museum operations or the property is conveyed to the city. In either case, budget impacts would depend on whether the city chose to fund any shortfalls in operating expenses.

The exact size of these impacts is not yet known, but given the relatively small amount of land involved, the total impact is also likely to be small. Resale of land for development is likely to have a small positive impact on city taxes, despite the loss of the DOE PILT, because the current payment is based on an estimated value of $6,450/acre, and the 25% assessment rate used for farmland. Undeveloped industrial land in Oak Ridge has historically been valued between $17,000 and $65,000/acre, and is assessed for tax purposes at 40% of value; commercial land has been valued higher (ORNL 2002). Assuming that parcels are sold to tax-paying entities, increased real estate taxes for each parcel are expected to outweigh the lost PILT. Successful development would further increase the value of the property and associated real estate taxes. In addition, any retail development would increase sales tax revenue in proportion to the new sales generated.

Maximum potential negative impact would only occur if the properties were conveyed to the city of Oak Ridge, fundraising for the endowment was unsuccessful and, in some future year, the city was required to fund the entire budget of $1.8 million (AMSEF 2006; Fowler 2006). An increase to $1.8 million would increase total city outlays by about 5% over the 2007 budget shown in Table 3.4. While this could have a noticeable impact on city finances and/or tax rates, it is unlikely to result in any changes in population, employment, or income beyond those already discussed in Sects. 4.8.1.1 and 4.8.1.2 above. Actual impacts are likely to be smaller because the city would probably consider ways to limit costs, such as reducing operating hours, or even closing the facility.

4.8.2 No Action

Under the no action alternative, there would be no major change in anticipated population, employment, income, or fiscal characteristics, and no disproportionate effect on minority or low-income populations within the ROI. However, if the DOE contractors could no longer continue funding for AMSE, the museum could be forced to limit hours of operation or close. This could result in layoffs or the potential loss of about 21 full-time employees.

4.9 INFRASTRUCTURE AND SUPPORT SERVICES

4.9.1 Transportation

4.9.1.1 Proposed action

New development at each of the parcels would not be large enough to have more than a minor increase in the amount of traffic entering and exiting the existing roads surrounding the parcels. A minor increase in the amount of traffic should also not substantially increase the chance of accidents occurring. However, installing turn lanes, additional traffic signals, and frontage roads could mitigate these types of potential impacts, if necessary. This would especially be true for new development at Parcel G. Access to Parcel G from Bethel Valley Road may necessitate changes to the current traffic light settings at the intersection of Bethel Valley Road and Scarboro Road.

4.9.1.2 No action

Under the no action alternative, there would be little to no change from the baseline level of vehicle trips or the potential for accidents involving vehicles in the vicinity of any of the parcels. At the baseline level of activity, traffic volume is considered to be within the existing transportation infrastructure's capacity.

4.9.2 Utilities

4.9.2.1 Proposed action

Under the proposed action, utility impacts would be expected to be minimal. New development at any of the parcels could connect to the existing city of Oak Ridge utility systems that already exist on each parcel or are immediately adjacent. Construction of new utility infrastructure would generally be limited. Existing utilities are also sufficient for the continued operation of AMSE. However, the facility has a lot of potential for a more energy-efficient technology upgrade and reduced energy consumption.

4.9.2.2 No action

No additional utility impacts would occur under the no action alternative. Existing utilities at AMSE are sufficient for continued operation.

4.10 NOISE

4.10.1 Proposed Action

Site preparation activities, erection of buildings, and the paving of parking lots for new development on any of the affected parcels would require the use of heavy equipment for the clearing, leveling, and construction of the buildings. Equipment, such as front-end loaders and backhoes, would produce noise

levels around 73 to 94 “A-weighted decibels” (dBA) at 50 ft from the work site under normal working conditions (Cantor 1996; Magrab 1975). The finishing work within the building structures would create noise levels slightly above normal background. Sound levels would be expected to dissipate to background levels within a relatively short distance and would be intermittent and temporary. No sensitive noise resources are located in the immediate vicinity of any of the three parcels.

Operation of any new developments would likely generate some minor noise. However, the AMSE property and Parcel 279.01 already experience some elevated background noise primarily from vehicle traffic and their location within the city. Although Parcel G is relatively isolated and not within an area of extensive urban development, it is also impacted somewhat by nearby traffic noise generated from vehicles traveling on Bethel Valley Road.

4.10.2 No Action

Under the no action alternative, there would be no additional noise impacts above baseline conditions.

4.11 INTENTIONAL DESTRUCTIVE ACTS

DOE is required to consider intentional destructive acts, such as sabotage and terrorism, in each EIS or EA that it prepares. A quantitative analysis of the potential for intentional destructive acts was not performed. After review, it was determined that the likelihood of such acts for the properties being considered for conveyance is extremely low. It is possible that random acts of vandalism could happen at the AMSE but would be highly unlikely for Parcel G and Parcel 279.01.

5. CUMULATIVE IMPACTS

Cumulative impacts are those that may result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 *CFR* 1508.7, CEQ 1997), and can result from the combined or synergistic effects of individually minor actions over a period of time.

5.1 POTENTIALLY CUMULATIVE ACTIONS

This section describes present actions as well as reasonably foreseeable future actions that are considered pertinent to the analysis of cumulative impacts for the conveyance of the AMSE, Parcel G, and Parcel 279.01. The actions are as follows.

Horizon Center Industrial Park (also referred to as Parcel ED-1). DOE has transferred title to the developable portion of Parcel ED-1 (approximately 426 acres) to Horizon Center LLC, a subsidiary of the Community Reuse Organization of East Tennessee (CROET), for the continued development as an industrial/business park for research and development, medical technology, manufacturing, distribution, and corporate headquarters office facilities. DOE maintains ownership of the remainder of the parcel, which includes the Natural Area (approximately 491 acres). Horizon Center LLC, under a lease agreement with DOE leases the Natural Area.

East Tennessee Technology Park (ETTP) (Heritage Center) Reindustrialization. DOE has made some of its underutilized facilities at ETTP available for lease to CROET, who in turn is subleasing these facilities to private sector firms (DOE 1997). With the onset of the accelerated cleanup plan for ETTP, DOE has begun to transfer title to some buildings and land parcels to CROET. To date, six buildings, totaling over 300,000 ft^2, have been transferred and work is progressing on the transfer of additional facilities (CROET 2006). As cleanup is progressing, DOE and CROET are transitioning the former gaseous diffusion plant to a private industrial park known as the Heritage Center. Commercial use of these facilities does not constitute a change of the primary use of the property, which has been industrial for about 60 years.

Spallation Neutron Source Project. The Spallation Neutron Source (SNS) is a state-of-the-art, high-flux, short-pulsed neutron source facility occupying about 110 acres near ORNL. The SNS is located within the ORR on Chestnut Ridge. About 15 permanent buildings covering about 6 acres have been constructed for the project. The SNS facility, which generates subatomic particles called neutrons for materials testing and other research, began operation in April 2006. At full operation, the facility is expected to employ about 500 people and generate over 2000 user visits per year (Munger 2006).

Y-12 Modernization Program. DOE has issued a Final Site-Wide EIS and Record of Decision (DOE/EIS-0309) for the operation of the Y-12 and modernization of facilities. Major actions include construction of a Highly Enriched Uranium Materials Facility, which will replace multiple aging facilities within a single state-of-the-art storage facility; a Purification Facility, which was completed in 2004; a Uranium Processing Facility, which will replace current enriched uranium and other processing operations; and the Beryillium Capability Project, which will upgrade an existing facility. Many existing facilities have been demolished to prepare for the new construction that began in 2003. By 2013, when the Uranium Processing Facility becomes operational, Y-12 will have reduced its defense manufacturing footprint by almost half.

Oak Ridge National Laboratory Revitalization Program. DOE is implementing a Facilities Revitalization Program (FRP) at ORNL to modernize some ORNL facilities, maintain ORNL's competitive research and development capabilities, enhance worker health and safety, and reduce operating costs. The FRP includes constructing new facilities on brownfield land and remodeling numerous existing facilities to relocate ORNL staff currently housed at Y-12, other ORR facilities, and in commercial office space. New facilities have been constructed in Bethel Valley near the main ORNL entrance, near the West Portal in Bethel Valley, and within the footprint for the SNS. Some of the new construction is being funded by the state of Tennessee and the private sector. About 20 acres of brownfield property in Bethel Valley have been transferred from DOE to the private sector in support of this proposed action. The environmental consequences of this project were reviewed in an EA, and a FONSI was signed on June 1, 2001 (DOE 2001b).

Oak Ridge Science and Technology Park. DOE has leased approximately 12 acres of underutilized property to Halcyon LLC, a subsidiary of CROET. The leased property is located along Bethel Valley Road. The leased property is part of the Facilities Revitalization Project at ORNL for which DOE completed an EA (DOE/EA-1362) and issued a FONSI in 2001. It is expected that development of the area will include approximately 150,000 ft^2 of new research/office space.

Roane Regional Business and Technology Park. This industrial park is located north of Interstate 40 in Roane County approximately 3 miles southwest of the western portion of ORNL. The 655-acre site includes areas for industrial development and greenbelt uses. The park will be developed in three phases. Phase I development of 200 acres was completed in late 2001 and is expected to house industries that will provide about 500 jobs. Industries located at the site include instrumentation, light metalwork, and materials handling. Additional types of industries expected to locate at the park include information technology, automotive transportation, and corporate administrative offices (Human 2000, TECD 2006).

Oak Ridge Industrial Center. The Oak Ridge Industrial Center is located at the site partially developed by TVA for the Clinch River Breeder Reactor prior to 1983. The 1245-acre property is for sale by TVA and has been considered for development by several manufacturing industries. TVA has graded a 150-acre tract on the property to <2% slope. The remaining land is rolling to rough terrain, having an 8 to 20% slope (ORCC 1999). The developable land contains tracts with hardwood forests and pine plantations impacted by the Southern pine beetle. The site also contains cultural resources. TVA has also designated a 103-acre tract bordering Grassy Creek as the Grassy Creek Habitat Protection Area to be reserved for protection of bugbane (*Cimicifuga rubifolia*) habitat (TVA 1988). A feeder road may be constructed by the Tennessee Department of Transportation (TDOT) to improve access from State Route (SR) 58, pending the sale and further industrial development of the property (ORCC 1999).

Pine Ridge Development. In 1969 the city of Oak Ridge acquired 230 acres of property, identified as Site X, from the then Atomic Energy Commission. The property included the current Valley Industrial Park and a portion of Pine Ridge. In 1999 the city transferred approximately 71 acres of Pine Ridge between South Illinois Avenue, Union Valley Road, and Scarboro Road to the Industrial Development Board, which in turn sold the property to a private developer. The area is now being developed for office space, light manufacturing, and storage facilities.

Rarity Ridge Development. A private development company is constructing a mixed, residential/commercial development project for the former Boeing property in western Oak Ridge (Roane County). The developer purchased about 1200 acres from the previous property owner and an additional 182 acres of adjoining floodplain from DOE. DOE completed an EA for the transfer of the floodplain (DOE/EA-1361) and issued a FONSI on January 31, 2001. In February 2000, the Oak Ridge City Council voted to rezone the property from industrial to mixed use. The most recent Rarity Ridge plan

calls for 3,000 to 4,000 new housing units and 500,000 to 1,250,000 ft^2 of commercial space. More than 100 acres are planned for parks, 17 acres for active recreation, and more than 30 acres will be retained as a preserve with limited access. In addition, approximately 440 acres will be transferred to a third party for open space and recreational purposes. Up to 200 homes may be completed by the end of 2006.

Parcel ED-6 Development. DOE has determined that Parcel ED-6 (approximately 336 acres) is excess property and is considering conveyance to the city of Oak Ridge for new residential development. Under the mixed development alternative, a portion of the land could also be used for commercial development (offices and retail establishments). The general location of the property is west of Wisconsin Avenue, south of Whippoorwill Drive, north of the Oak Ridge Turnpike (SR 95), and east of the Horizon Center Industrial Park. A portion of the North Boundary Greenway is located on the parcel and is maintained by the city under a license from DOE. Parcel ED-6 is part of the area included in the ORR Land Use Planning Process conducted during 2001 and 2002 (Focus Group 2002).

5.2 CUMULATIVE IMPACTS BY RESOURCE AREA

5.2.1 Land Use

Of the original 58,582 acres of land purchased in 1942 by the Federal Government, 24,860 acres have been conveyed and approximately 34,000 acres remain within the ORR. The purposes that ORR land has been conveyed for include:

- 16,855 acres for residential, commercial, and community development;
- 1,031 acres to federal agencies and for transportation easements;
- 3,208 acres for preservation and recreation;
- 3,755 acres for industrial development; and
- 11 acres for mission-related purposes.

Current land outgrants (lease/license/permit areas) include:

- 2,966 acres for Black Oak Ridge Conservation Easement;
- 2,929 acres for the Three Bend Scenic and Wildlife Management Refuge Area; and
- 491 acres for the Parcel ED-1 Natural Area.

Title transfer of land and facilities at ETTP could potentially remove an additional 1,600 acres of land. However, the majority of the ETTP area being considered for title transfer has already been developed for industrial purposes or been impacted in some other way. Further development would not result in a major change from the existing industrial land use. The conveyance of the AMSE and associated property, Parcel G, and Parcel 279.01 would add approximately 24 acres of additional land for development purposes. Because the area within each of the parcels has been previously disturbed and the total area is small compared to the remaining ORR land, the change in land use would result in negligible cumulative land use impacts.

5.2.2 Air Quality

Although the proposed action evaluated in this EA does not appear to have the potential to bring about major impacts to air quality, the overall trend in the Roane and Anderson counties area does present such a potential. Other types of industrial development, increased traffic, and general population growth could also impact air quality.

Construction activities, although exempt from PSD limits in 40 *CFR* 52.21, can be a major source of emissions, particularly PM_{10}, in the form of fugitive dust. Such sources tend to be of short duration (during the construction period) and largely result in impacts of a localized nature. For example, construction of the Knoxville bypass and widening of SR 58 would produce particulate emissions during disturbance of soils, but these temporary emissions could be minimized by application of wetting agents during dry periods.

5.2.3 Socioeconomics

Major industrial initiatives include reindustrialization of the ETTP, Horizon Center development, the SNS project at ORNL, the Roane Regional Business and Technology Park, and potential development of the Oak Ridge Industrial Center. The Rarity Ridge initiative also includes plans for commercial development. The cumulative impact of new development is likely to result in increased population, employment, and income. The parcels included in the proposed action form a very small part of the total acreage proposed for development, and its effect on the cumulative impacts is expected to be correspondingly small.

Actual employment and income impacts from cumulative development will depend on the success of each of these developments and the overall rate at which development proceeds, both of which are uncertain. Developers have recently scaled back plans for some of these projects based on current market conditions (Huotari 2006). Property tax revenue will depend on the value of the properties, future tax rates, and any tax abatements that may be negotiated. While additional sales tax revenue from proposed commercial development is also likely, the exact amount will depend on the amount and type of new commercial development and residents' actual buying patterns.

5.2.4 Transportation

Cumulative transportation impacts in Roane and Anderson counties could occur from increased development and growth. These potential impacts could be combined with ongoing environmental restoration and decontamination and decommissioning activities on the ORR and with the planned expansion of the state highways by TDOT. The main transportation impact of commercial and industrial development would be an increase in average daily traffic volumes.

Associated with increases in traffic is the potential for an increased number of accidents, additional noise and air pollution, and road deterioration and damage. The increase in average daily traffic volumes could result in inconveniences for other vehicles (personal and commercial) on affected routes and connecting roads. Commercial operations could suffer temporarily reduced business while customers avoid affected areas because of traffic delays. Increased pavement deterioration and damage could increase costs associated with maintaining or resurfacing roads and highways. Although noise associated with increases in traffic is normally not harmful to hearing, increased traffic noise is considered by the public to be a nuisance. Increased accidents put an additional strain on local emergency response personnel. Increased vehicular traffic also has the greatest potential to increase air pollution in the local area because emissions from motor vehicles are poorly regulated.

5.2.5 Biodiversity

The greatest threat to reduced biodiversity of an area or region is conversion of cover types from natural systems to completely different and maintained systems. As an example, the conversion of an upland hardwood forest to pasture or hayfield use can result in nearly the same loss of biodiversity as if the woodland were converted to industrial use.

No areas of sensitive or rare habitats or species are located within any of the three parcels considered in this EA. Conveyance of the properties and any subsequent development would have a negligible affect on the biodiversity of the Oak Ridge area.

Some local industrial development projects are mitigating impacts to habitats. Approximately 491 acres of the Horizon Center is not available for development and contains Natural Area corridors and buffers for native vegetation and wildlife species. There are 103 acres along Grassy Creek reserved for habitat protection at the Oak Ridge Industrial Center (TVA 1988). About 61 acres of the Roane Regional Business and Technology Park are being left as a greenbelt area. The SNS project will create wetland habitat to replace habitat lost during construction, and cooling water will be dechlorinated prior to discharge to minimize effects on aquatic resources (DOE 1999). In addition, a forested pathway will be retained along Chestnut Ridge during vegetation clearing for the SNS project to minimize effects on terrestrial wildlife movements (DOE 1999). Efforts to reuse the industrial facilities at ETTP could reduce the number of habitat areas that might otherwise be converted to industrial sites. Additionally, approximately 3000 acres of Blackoak Ridge and Mckinney Ridge are being managed by the state as a conservation easement under a license from DOE. Additionally, portions of Pine Ridge are not suitable for development and provide a large area to protect sensitive ecological resources.

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6. REGULATORY COMPLIANCE

Section 176(c) of the Clean Air Act of 1970 (CAA) (42 U.S.C. 7401, et seq.) requires federal agencies to ensure that their actions are consistent with the CAA and with applicable air quality management plans (state implementation plans). Agencies are required to evaluate their proposed actions to make sure they will not violate or contribute to new violations of any federal ambient air quality standards; will not increase the frequency or severity of any existing violations of federal ambient air quality standards; and will not delay the timely attainment of federal ambient air quality standards.

The EPA has promulgated separate rules that establish conformity analysis procedures for transportation-related action and for other (general) federal agency actions. The EPA general conformity rule requires a formal conformity determination document for federal actions occurring in nonattainment areas or in certain designated maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The CAA conformity guidelines do not apply to the proposed DOE action because the affected parcels are in an attainment area.

During the NEPA process, DOE contacts the FWS to obtain the latest information on threatened and endangered species or designated critical habitats that could occur in the vicinity of the proposed action. If DOE determines that any threatened and endangered species or critical habitat could be adversely impacted by the proposed action, informal or formal consultation with the FWS is initiated under Sect. 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.). The TDEC-Division of Natural Heritage database is also often checked for listings of sensitive species that may occur in or near the affected area. Threatened and endangered species are discussed in Sects. 3.6.4 and 4.6.4. Appendix A includes correspondence between DOE and the FWS.

DOE is also required under Sect. 106 of the NHPA to consult with the TN-SHPO regarding the presence of archaeological and historic sites and the potential for adverse impacts at a proposed project site. Consultation with the TN-SHPO is discussed in Sect. 4.7.1.

Under the FPPA, DOE is sometimes required to consult with the Natural Resource Conservation Service regarding the presence and future use of prime farmland soils at a proposed site. The Natural Resources Conservation Service has advised DOE that for property that lies wholly within the city of Oak Ridge, the prime farmland designation is waived, and other uses of the land, such as industrial development, are permitted.

The DOE Regulation for Compliance with Floodplain/Wetlands Environmental Review Requirements [10 *CFR* 1022.5(d)] states that "when property in a floodplain or wetlands is proposed for lease, easement, ROW, or disposal to non-Federal public or private parties, DOE shall: (1) identify those uses that are restricted under federal, state, or local floodplains or wetlands regulations; (2) attach other appropriate restrictions to the uses of the property; or (3) withhold the property from conveyance."

CERCLA 120(h) establishes many requirements for transfer of federally owned property, including property that has been contaminated or property that can be identified as uncontaminated.

Relevant DOE orders that pertain to actions involving property transfer include DOE Order 430.1, "Life Cycle Asset Management"; DOE Order 5400.1, "General Environmental Protection Program"; and DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

Private developers would be responsible for seeking and obtaining federal, state, and/or local permits and licenses for any proposed pre-construction, construction, and operation activities Regulations implementing the CAA, Clean Water Act of 1972, Nuclear Regulatory Commission rules, Resource Conservation and Recovery Act of 1976, Safe Drinking Water Act of 1974, Toxic Substances Control Act of 1976, Emergency Planning and Community Right-to-Know Act of 1986, and others may apply.

7. LIST OF AGENCIES AND PERSONS CONTACTED

The following agencies and persons were contacted for information and data used in the preparation of this EA.

Name	Affiliation	Location	Topic
Lee Barclay	U.S. Fish and Wildlife Service	Cookeville, TN	Endangered Species Act, Sect. 7 – Informal Consultation
Jeff Deardorff	Community Reuse Organization of East Tennessee	Oak Ridge, TN	Cumulative Impacts
Kim Denton	Oak Ridge Chamber of Commerce	Oak Ridge, TN	Cumulative Impacts
Amy Fitzgerald	City of Oak Ridge	Oak Ridge, TN	Socioeconomics
Joseph Garrison	Tennessee Historical Commission	Nashville, TN	National Historic Preservation Act, Sect. 106 – Compliance
Gary Human	Roane County Industrial Development Board	Kingston, TN	Cumulative Impacts
Michael Ryon	Oak Ridge National Laboratory	Oak Ridge, TN	Aquatic Resources
Billy Stair	Oak Ridge National Laboratory	Oak Ridge, TN	Socioeconomics
Steve Stow	American Museum of Science and Energy Foundation	Oak Ridge, TN	Background
Lawrence Young	Community Reuse Organization of East Tennessee	Oak Ridge, TN	Socioeconomics

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